

OBSERVATIONS ON DISTRIBUTION, ABUNDANCE, AND HABITATS OF
SIDALCEA NELSONIANA PIPER (MALVACEAE) IN OREGON

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ABSTRACT

The distribution, abundance, and habitats of *Sidalcea nelsoniana* were studied throughout its range for seven growing seasons (1985-1991). The US Fish and Wildlife Service (1993) recently listed the species as Threatened; the State of Oregon listed it as Threatened in 1989. In early 1985, only a few extant sites were known and the published habitat information was scant and contradictory. The authors conducted systematic searches for new sites, made exact counts or statistical estimates of the numbers of individual plants at each site, observed the relative proportions of pistillate-flowered and perfect flowered plants in most populations, and identified the taxa most commonly associated with *Sidalcea nelsoniana*. Soil sampling showed that the species tolerated a range of soil textures and moisture levels. *Sidalcea nelsoniana* was most commonly found in association with early to mid-seral species in four habitats: ruderal, valley woodlands, wet meadows, and mountain meadows, in the Coast Range and the Willamette Valley of Oregon. At the conclusion of the 1991 field season, 48 sites containing an estimated 24,158 plants were known. *Sidalcea nelsoniana* has been found to be somewhat more widely spread than previously reported, as

well as considerably more abundant. It now occupies a broad variety of habitats. This ability, coupled with federal and state protection, could assure its survival.

KEY WORDS: *Sidalcea nelsoniana*, Malvaceae, threatened species, Oregon

INTRODUCTION

Nelson's checker-mallow (*Sidalcea nelsoniana* Piper [Malvaceae]), a gynodioecious, rhizomatous perennial, is found in western Oregon and Washington, from southern Benton County, Oregon, north to Cowlitz County, Washington (CH2M HILL 1991; Halse & Glad 1986; Halse *et al.* 1992). The species was first collected in 1871 and was described 48 years later (Piper 1919). In the first Oregon list of rare, threatened, and endangered species, Siddall *et al.* (1979) included *Sidalcea nelsoniana* in the endangered category with the comment, "... known only from two small populations, both along roadsides." The species is listed as threatened by both the U.S. Fish and Wildlife Service (1993) and the State of Oregon (Oregon Administrative Rules 603-37-070). Before this study began, the Oregon Natural Heritage Data Base (ONHDB 1984) reported some twenty-four extant or historical sites apparently supporting the species; plants at some sites were thought to be hybrids.

Prior to this study, published accounts of *Sidalcea nelsoniana* habitat were often confusing and contradictory. Roush (1931) commented that members of the genus are mesophytes, found in moist sites in mesic regions or in moist but soon desiccated sites in arid regions. Hitchcock (1957) and Hitchcock & Cronquist (1961, 1973) stated that the species occurs in more or less gravelly, well-drained soil. Peck (1961) wrote that *Sidalcea nelsoniana* is found on moist, open ground and in thickets.

Sidalcea nelsoniana was discovered at Walker Flat, western Yamhill County, in late summer 1984. Walker Flat was then under investigation as the site for a proposed water supply reservoir. Studies were initiated in 1985 to determine its abundance, distribution, and habitat preference. Investigations of *Sidalcea nelsoniana* at Walker Flat were discussed in Glad *et al.* (1987). This paper describes the results of seven years of surveys monitoring the species' status throughout its known range.

METHODS

The authors examined all available aerial photographs of the Coast Range and Willamette Valley north of 44°15' north latitude and east of 110° west longitude. Open areas in the Coast Range that appeared similar to Walker Flat

in vegetation, topography, and soil moisture were noted for further investigation. Selection of sites to be examined in the Willamette Valley was based on scanty habitat information available in Hitchcock (1957), Hitchcock & Cronquist (1961, 1973), Meinke (1982), ONHDB (1984), and Peck (1961). They included valley woodlands dominated by *Fraxinus*, abandoned fields, moist meadows and primary drainages, and wide roadside ditches, except where recent development or changes in land use had made them unsuitable as *Sidalcea nelsoniana* habitat. A helicopter was used to examine sites not easily accessible by road and sites scattered along the periphery of the valley.

Once sites were identified as potential *Sidalcea nelsoniana* habitat, they were searched by at least two individuals, walking slowly in parallel paths 2 m to 5 m apart (depending on height of vegetation), until the entire area delineated on the aerial photograph was inspected. Sites where *Sidalcea nelsoniana* was found were marked on maps. Searches of potential new sites took place primarily in 1985 and 1986, and thereafter only as new potential sites were identified. Occasionally land use changes or other circumstances indicated areas adjacent to known populations that warranted investigation, thus expanding the outer boundaries at some sites.

Sidalcea nelsoniana is rhizomatous, making determination of individual plants difficult. Study personnel and representatives of the U.S. Fish and Wildlife Service and the Bureau of Land Management agreed, before the initiation of 1987 field studies, that a single plant was contained within 1 m diameter circle. This definition was supported by earlier excavation of *Sidalcea nelsoniana* rhizomes in both the Willamette Valley and the Coast Range. Where two sexes were present, pistillate and perfect flowered plants were counted separately. The counts were not subjected to statistical treatment.

Plant counts took place at all but two sites annually from 1985 through 1990. In 1991 plant counts were done only at newly discovered sites and those which had undergone disturbance since the previous count. Where no apparent changes had occurred, it was assumed that the size of the population remained the same.

The sizes of the two largest Coast Range populations were estimated by statistical sampling. All potential *Sidalcea nelsoniana* habitat at Walker Flat and Tillamook Burn 1 was mapped. A grid pattern was used to sample one-meter-square quadrats. The random stratified sampling included between one and three percent of the total quadrats at each site. The frequency of *Sidalcea nelsoniana* was determined as a percent of quadrats containing at least one stem. Multi-stemmed *Sidalcea nelsoniana* within a quadrat was assumed to be a single plant. If plants of different sexes were observed within a quadrat, two plants were tallied. The upper and lower 95 percent confidence limits for estimates were calculated by the exact distribution method (Steel & Torrie 1980).

In 1987 all known populations of *Sidalcea nelsoniana* were examined to de-

termine the relative numbers of pistillate-flowered and perfect-flowered plants. Except at Walker Flat, all the flowering pistillate-flowered and perfect-flowered plants present were counted. At Walker Flat, 77 randomly selected plants were checked. Ratios of pistillate-flowered to perfect-flowered plants were calculated.

Quantitative sampling of vascular plant cover was done at each site in 1986. One to five 1 m² quadrats were centered on *Sidalcea nelsoniana* plants, the number of plots being determined by the vegetative diversity and areal extent of the site. We estimated relative (canopy) cover of all vascular plant taxa present within the quadrat. Slope, aspect, other physical characteristics of each site, and other plant taxa present but not occurring within the quadrats were recorded.

Soil samples were taken at 25 populations in July, 1986, to determine soil texture and hydricity. Each was taken within 15 cm of a *Sidalcea nelsoniana* plant, at a depth of 30 cm. Soil color was determined by comparison with a Munsell© color chart and depth to mottling was recorded.

A qualitative comparison of all Willamette Valley *Sidalcea nelsoniana* sites resulted in our dividing them into four habitat categories: ruderal sites (weedy, with evidence of recent or continuing disturbance), wet meadows (with soils moist into early summer), valley woodlands (mixed stands of *Frazinus*, *Quercus*, and other trees and shrubs), and mountain meadows (grassy areas in montane valleys). Some sites included more than one habitat category.

RESULTS AND DISCUSSION

More than 1,000 sites potentially capable of supporting *Sidalcea nelsoniana* were identified in the course of this study. Approximately half of those sites were searched intensively; the remaining sites were unsuitable *Sidalcea nelsoniana* habitat because of land use, topography, or extant vegetation (e.g., dense *Rubus* thickets, heavy tree cover). Between 1986 and 1991, we found and documented 30 previously undiscovered sites of *Sidalcea nelsoniana*.

At the beginning of this study, 24 possible sites were listed by ONHDB (1984) as supporting *Sidalcea nelsoniana*. Examination of herbarium specimens or field inspection showed five sites to contain only other *Sidalcea* species. Nine of the sites could not be located; the collections had taken place 20 to 70 years previously, and in most cases, original collection data were inadequate to determine exact locations. *Sidalcea nelsoniana* had been destroyed at one site. The remaining nine listed "sites" occurred from Benton County to Yamhill County, with three at Finley National Wildlife Refuge (NWR). We found no evidence of hybridization at any site (Halse *et al.* 1989). Figure 1 shows approximate locations of historical sites where *Sidalcea nelsoniana* is no longer found, and of sites where the species has been found or confirmed since 1985.

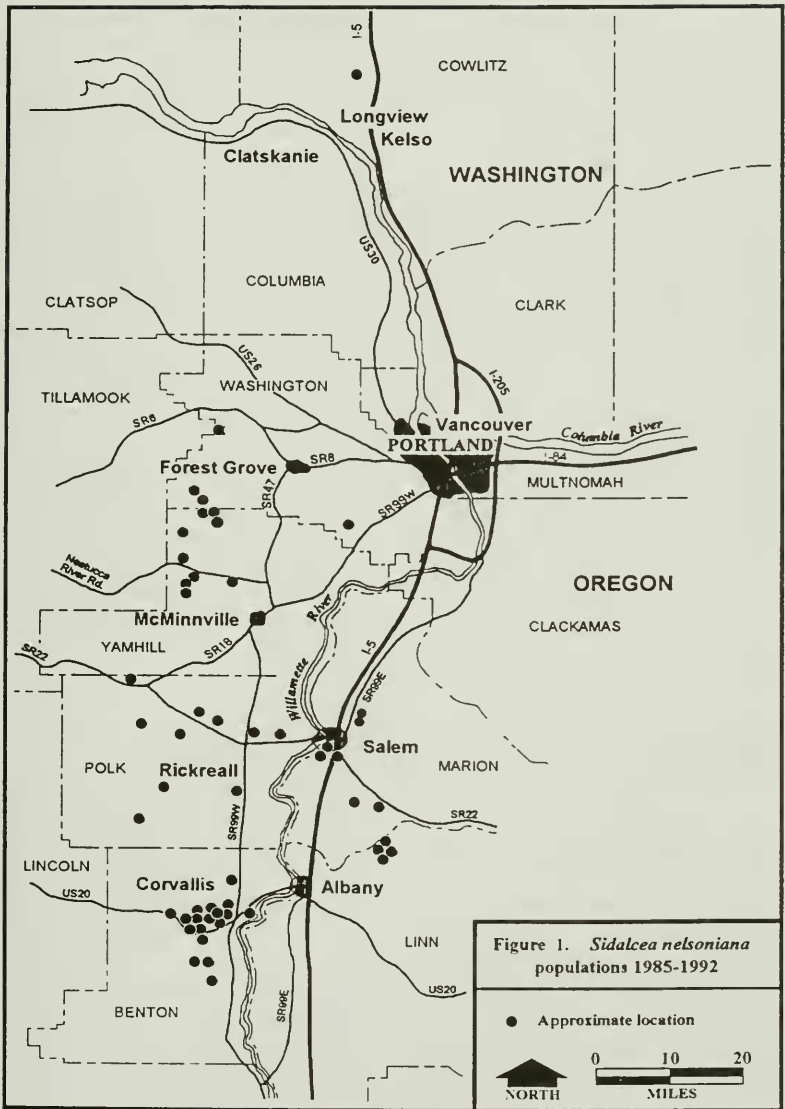


Figure 1. *Sidalcea nelsoniana* populations 1985-1992

● Approximate location



0 10 20
MILES

Sidalcea nelsoniana site counts for 1985 through 1991 are summarized in Table 1. In 1985, we searched 22 sites supporting *Sidalcea nelsoniana* and counted 4,781 plants. In 1986, 1987, and 1988, there were 32 sites supporting *Sidalcea nelsoniana*. The species occurred at 39 sites in 1989, at 44 sites in 1990. In 1991, 24,158 plants were estimated to be present at 48 sites, assuming no changes in plant numbers at undisturbed sites since the last count. All of the plants occurred naturally.

The annual increases in plant numbers shown on Table 1 can be attributed to three factors. There was an increase of the search area at many sites as we learned more about *Sidalcea nelsoniana*'s habitat occurrence (e.g., Devils Lake Fork, Burkland Lumber). As we gained increased experience in finding *Sidalcea nelsoniana* plants, we recognized plants at new sites during other activities. There was also natural increase by both vegetative and sexual reproduction. Seedlings were seen at almost all sites during the course of this study and vegetative expansion of plants was also noted at many sites (e.g., Nelson's Golden Valley, Meadow Lake, OSU Turkey Farm, Finley NWR). Decreases usually appeared to result from human activities. Agents of disturbance included vegetation control, particularly mowing (e.g., SR22, SR99), herbicide application (e.g., Panther Creek, OSU Horse Center), and mechanical brush removal (e.g., Monmouth, OSU Turkey Farm). Other sites were affected by mowing, cultivation, and construction (e.g., Salem Airport, Dallas). Four sites (e.g., Monmouth, Mount Jefferson) were completely destroyed.

Sidalcea nelsoniana occurs on both moist sites and sites which become desiccated in the summer. Contrary to other reports (Meinke 1982; ONHDB 1984), it is not restricted to native prairie remnants or wetlands. The species was found to be widespread in the Willamette Valley and to occur at ten sites in the Oregon Coast Range as well, rather than being restricted to "a handful of populations . . . [all but one] along roads" (Meinke 1982).

Physical site data and cover sampling showed that *Sidalcea nelsoniana* is not consistently associated with any identifiable plant community or habitat. The species was found in association with 111 taxa; at least 48 of these are aliens (CH2M HILL 1986). About one-half of the commonly associated species (frequency >10% in sampled quadrats) were aliens; only five taxa (*Agrostis* spp., *Cirsium* spp., *Festuca* spp., *Vicia* spp., and *Holcus lanatus* L.) occurred more than 25 percent of the time.

Sidalcea nelsoniana is a gynodioecious species, which means that individual plants are either perfect-flowered (hermaphrodites) or pistillate-flowered (female). Table 2 lists the number of plants counted and the number of non-flowering, pistillate-flowered, and perfect-flowered plants at 32 sites in 1987. Thirty of the sites had plants in flower at the time of the survey; two sites (Wendland Farm and Monmouth) had none. There were 6,517 plants counted. Twenty-six percent (1,721) were not in flower. Of the remaining 4,796 plants, 58 percent were pistillate-flowered and 42 percent were perfect-flowered. There

TABLE 1. NUMBER AND LOCATION OF *SIDALCEA NELSONIANA* PLANTS IN WESTERN OREGON, 1985-1991

Site	1985	1986	1987	1988	1989	1990	1991
Benton County, Oregon							
Bald Hill Park	30	132	168	234	227	346	346 ^b
Bellfountain Road	.	.	.	.	.	7	6
Decker Road	.	.	.	.	.	7	7
Dixon Creek	2	0	0	0	0	0	0
Finley NWR	294	1,288	1,368	1,831	2,351	2,366	2,366 ^b
Industrial Way	.	.	.	.	.	24	24 ^b
Lewisburg	.	.	173	188	162	198	198 ^b
OSU Horse Center	.	290	342	402	408	656	656 ^b
OSU Turkey Farm	427	690	995	1,611	1,586	1,784	1,784 ^b
Philomath	3	11	9	9	13	21	21 ^b
Philomath North	2	2	2	2	0	1	1 ^b
Reservoir Road	.	.	.	.	.	.	1 ^b
Squaw Creek	.	.	.	.	56	70	70 ^b
Starker Park	.	.	.	.	.	49	49 ^b
Walnut Park	8	5	2	4	4	4	4 ^b
Water Works	.	.	.	.	62	56	56 ^b
Wren	.	.	.	.	.	83	83
Cowlitz County, Washington							
Coal Creek	.	.	.	.	.	.	111
Linn County, Oregon							
Hess Road	30	94	76	35	90	359	359 ^b
Mount Jefferson	60	60	0	0	0	0	0 ^b
Ridge Drive	.	10	7	10	15	25	25 ^b
Shelburn	.	.	.	.	2	2	2
Marion County							
Aumsville	7	7	10	12	14	16	16 ^b
Burkland Lumber	50	50	86	104	67	158	158 ^b
Fletcher Road	.	52	26	22	33	27	27 ^b
KOA	.	2	1	2	2	2	2 ^b
Salem Airport	321	909	1,081	1,042	1,055	1,429	1,429 ^b
Walker Road	.	49	56	45	47	54	54
Wendland Farm	.	112	9	13	17	29	0
Polk County, Oregon							
Bridgeport School	6	9	9	9	11	15	15 ^b
Dallas South	.	236	318	452	362	338	271 ^b
Dyck Road	2	4	61	172	253	296	296 ^b
McTimmonds Valley	.	689	674	902	1,184	1,333	1,333 ^b
Monmouth	.	9	4	4	1	0	0
SR18	.	.	.	.	.	.	217 ^b
SR22	21	72	54	70	76	58	58 ^b
SR99W	12	73	60	57	60	251	251 ^b
Salt Creek	.	.	.	.	143	266	266

VanWell Road	.	260	100	122	180	134	134 ^b
Tillamook County, Oregon							
Devils Lake Fork	110	110	238	285	296	285	285 ^b
Washington County, Oregon							
Lakeside	.	.	.	.	.	248	232
Second Growth	.	.	.	.	.	116	112 ^b
Waibel Farm	.	45	62	105	186	175	175 ^b
Yamhill County							
Conchy	.	.	.	.	.	.	39
Meadow Lake	50	50	247	278	356	361	361 ^b
Nelson's Golden Valley	105	384	178	176	260	195	195 ^b
Nestucca River	1	3	2	2	2	2	2
North Fork	.	.	.	.	.	83	167 ^b
Panther Creek	12	41	21	17	21	22 ^b	22 ^b
Tillamook Burn 1	.	.	.	.	4,460	4,460	4,460
Tillamook Burn 2	.	.	.	.	5	17	14
Walker Flat	3,228	3,228 ^b	5,689 ^c	5,689 ^b	5,449 ^c	5,449 ^b	7,398 ^c
ESTIMATED TOTALS	4,781	8,976	12,129	13,906	19,516	21,870	24,158

^aSite not yet discovered.

^bNo change in site conditions observed since last visit;

^ccount assumed unchanged.

A statistical estimate, not an actual count.

was only one sex of flower at four sites (Table 2). The ratio of pistillate-flowered plants to perfect-flowered plants varied from 21.5:1 at Hess Road to 0.18:1 at Waibel Farm. The overall ratio was 1.36 pistillate-flowered plants for each perfect-flowered plant (Table 2).

It was beyond the scope of this study to determine how gynodioecious polymorphism in *Sidalcea nelsoniana* is inherited and maintained, and what the effects of a gynodioecious breeding system are on the population dynamics of the species. Seedlings have never been seen at sites with only pistillate-flowered plants. Plant counts have increased at sites with both female and hermaphroditic plants where seedlings have been observed (e.g., Hess Road, Finley NWR, OSU Turkey Farm). A portion of these observed increases may be due to sexual reproduction.

Soil cores taken at larger sites in 1986 indicated that not all soils supporting *Sidalcea nelsoniana* are hydric. Soil texture samples varied from loam to clay (Table 3). Twenty-two of 41 soil core samples showed low chromas or mottling, indicative of hydric soil conditions. Eleven of the samples lacked any such indication. Six of the samples were intermediate between hydric and non-hydric in chroma and mottling. At two sampling sites (Wendland Farm and Salem Airport), data were insufficient to make a hydricity determination because the soils were so gravelly that no cores could be taken. Soils data correlated with vegetation cover data and other site observations showed that *Sidalcea nelsoniana* occupies habitats ranging from permanently wet to well

TABLE 2. RATIOS OF PISTILLATE-FLOWERED PLANTS TO PERFECT-FLOWERED PLANTS AT SIDALCEA NELSONIANA POPULATION SITES, 1987.

Population/Site	Total Plants	No Flowers	Pistillate	Perfect	Ratio
Benton County, Oregon					
Bald Hill Park	168	21	82	65	1.26:1
Finley NWR	1368	293	679	396	1.71:1
Lewisburg	173	23	93	57	1.63:1
OSU Horse Center	342	117	128	97	1.32:1
OSU Turkey Farm	995	238	414	343	1.21:1
Philomath	9	5	3	1	3.00:1
Philomath North	2	0	2	0	N/A
Walnut Park	2	0	0	2	N/A
Linn County, Oregon					
Hess Road	76	31	43	2	21.50:1
Ridge Drive	7	4	2	1	2.00:1
Marion County, Oregon					
Aumsville	10	1	6	3	2.00:1
Burkland Lumber	86	2	54	30	1.80:1
Fletcher Road	26	11	11	4	2.75:1
KOA	1	0	1	0	N/A
Salem Airport	1081	321	481	279	1.72:1
Walker Road	56	3	41	12	3.42:1
Wendland Farm	9	9	0	0	N/A
Polk County, Oregon					
Bridgeport School	9	6	1	2	0.50:1
Dallas	318	17	194	107	1.81:1
Dyck Road	61	1	26	34	0.76:1
McTimmonds Valley	674	400	175	99	1.77:1
SR22	54	12	20	22	0.91:1
Monmouth	4	4	0	0	N/A
SR99W	60	31	12	17	0.71:1
Van Well Road	100	2	62	36	1.72:1
Tillamook County, Oregon					
Devils Lake Fork	239	49	93	97	0.96:1
Washington County, Oregon					
Waibel Farm	62	16	7	39	0.18:1
Yamhill County, Oregon					
Meadow Lake	247	8	79	160	0.49:1
Nelson's Golden Valley	178	45	39	94	0.41:1
Nestucca River	2	0	2	0	N/A
Panther Creek	21	3	3	15	0.20:1
Walker Flat	77	48	7	22	0.32:1

TABLE 3. SOIL CHARACTERISTICS AT SIDALCEA NELSONIANA SITES, 1986

Sample Site/ Site Type	Depth to Mottles	Munsell Color	pH	Soil Hydrichity	Disturbed?	Comments
Bald Hill Park Ruderal	None	10YR 3/2	6.5	Non-hydric	Yes	Roadside ditch; small stones in 20-30 cm zone
Bald Hill Park Valley Woodland	None	10YR 3/1	6.1	Hydric	No	Solid, very hard throughout profile
Finley NWR Valley Woodland	25 cm	10YR 5/6	6.2	Intermed.	No	On edge of gully; texture: clay
Finley NWR Valley Woodland	None	10YR 5/1	6.1	Hydric	No	0-13 cm loose, 13-30 cm compacted and clayey
Finley NWR Wet Meadow	0 cm	5YR 5/1	6.2	Hydric	No	13-30 cm soil very hard
Finley NWR Valley Woodland	None	10YR 5/3	6.1	Non-hydric	No	In ditch
Finley NWR Valley Woodland	10 cm	10YR 5/1	6.5	Hydric	No	Flat, bare areas and debris suggest periodic flooding
Finley NWR Ruderal	20 cm	10YR 5/2	6.7	Intermed.	No	Mottling very faint 20-30 cm
OSU Horse Center Valley Woodland	None	2.5YR 3/0 (13-30 cm)	5.9	Hydric	No	13-30 cm very hard black silty-clay

Sample Site/ Site Type	Depth to Mottles	Munsell Color	pH	Soil Hydricity	Disturbed?	Comments
OSU Horse Center Ruderal	None	10YR 3/1 (0-25 cm)	6.2	Hydric	No	25-30 cm hard black silty clay in grazed pasture
OSU Horse Center Ruderal	None	10YR 3/1	6.46	Hydric	No	Very hard clay-like material
OSU Turkey Farm Valley Woodland	None	5YR 3/1	6.7	Hydric	No	Uniform color in core, structure aggregated in 0-18 cm layer; texture: silty clay
OSU Turkey Farm Ruderal	None	5YR 3/1	6.5	Hydric	No	Uniform color and consistency throughout; texture: clay
Walnut Park Ruderal	None	2.5YR 2.5/0	5.1	Hydric	No	30 cm horizontally, 25 cm vertically from water level
Hess Road Valley Woodland	---	10YR 5/2	6.6	Insuf. Data	Yes	Rocky soil prevented most * measurements
Mt. Jefferson Ruderal	None	10YR 4/2	6.8	Non-hydric	Yes	Plowed; soil core has low integrity; texture: clay loam
Ridge Drive Ruderal	None	10YR 3/2	6.6	Non-hydric	No	Adjacent to railroad tracks
Aumsville Ruderal	---	5YR 3/1	6.6	Hydric	Yes	Abandoned gravel pit; rocky soil prevented most measurements

Sample Site/ Site Type	Depth to Mottles	Munsell Color	pH	Soil Hydrlicity	Disturbed?	Comments
Burkland Lumber Ruderal	None	10YR3/2 (0-20 cm) 7.5YR 5/0 (20-30 cm)	6.9	Hydric	Yes	Plowed in past; texture: silty clay loam
Fletcher Road Ruderal	None	10YR 3/1	6.9	Hydric	Yes	Roadside ditch; heavy clay at bottom of core
Salem Airport Ruderal	None	10YR 4/2 (0-30 cm)	7.1	Non-hydric	No	Stones in soil; 0-30 cm sample taken with trowel; texture: loam
Salem Airport Valley Woodland	---	10YR 4/2	6.9	No data	No	Stones in soil; 0-8 cm sample taken with trowel
Walker Road Ruderal	None	10YR 5/1	7.1	Hydric	No	Mapped (USGS) as intermittent streambed
Wendland Farm Ruderal	---	10YR 4/2	7.3	No data	Yes	Plowed in past; no soil core due to stones
Bridgport School Ruderal	25 cm	10YR 4/2	6.1	Intermed.	No	Mottles very weak
Dallas South Ruderal	20 cm	10YR 4/2 (0-20 cm)	5.8	Hydric	Yes	Plowed in past; sharp transition at 20 cm
Dallas South Valley Woodland	None	10YR 4/3	5.7	Non-hydric	No	Abandoned orchard; texture: silty clay

Sample Site/ Site Type	Depth to Mottles	Munsell Color	pH	Soil Hydrlicity	Disturbed?	Comments
Dyck Road Ruderal	0 cm	10YR 4/4	7.0	Intermed.	No	Poorly developed mottles throughout core; texture: clay loam
McTimmonds Valley Ruderal	None	10YR 5/3	6.2	Non-hydric	No	Regenerating clearcut; texture: clay
McTimmonds Valley Ruderal	15 cm	10YR 4/3	6.5	Intermed.	Yes	Within highway right-of-way
SR22 Ruderal	None	10YR 5/3	7.0	Non-hydric	Yes	Within highway right-of-way; texture: silty clay loam
SR22 Ruderal	15 cm	10YR 5/2 (0-15 cm)	7.0	Hydric	Yes	Roadside ditch; soil appears severely disturbed
SR99W Ruderal	None	10YR 3/1	7.0	Hydric	Yes	Roadside ditch; areas of heavy clay or silt-clay in core
SR99W Ruderal	None	10YR 3/1	6.9	Hydric	Yes	Both cultivation and ditch maintainancelikely
VanWell Road Ruderal	0 cm	10YR 3/2	6.7	Hydric	No	Very sparse mottles throughout core; high clay content
VanWell Road Ruderal	None	10YR 3/2	5.0	Non-hydric	No	High clay content

Sample Site/ Site Type	Depth to Mottles	Munsell Color	pH	Soil Hydrlicity	Disturbed?	Comments
VanWell Road Ruderal	10 cm	10YR 4/3	6.2	Intermed.	Yes	Plowed in past; mottles only in 10-15 cm area; texture: silty clay
Devils Lake Fork Mountain Meadow	None	10YR 3/2	7.0	Non-hydric	No	Uniform color throughout core
Waibel Farm Wet Meadow	None	7.5YR 2/0	6.8	Hydric	No	Free water on surface
Nelson's Golden Valley Mountain Meadow	23 cm	10YR 3/1	6.0	Hydric	No	High clay content 23-30 cm; no roots below 23 cm
Nelson's Golden Valley Mountain Meadow	10 cm	10YR 3/2	6.9	Hydric	No	High clay content in lower part of core
Panther Creek Ruderal	None	10YR 4/2	7.1	Non-hydric	Yes	Roadside ditch; pebbles; high clay content in parts

*0-15 cm samples collected with trowel.

drained.

The four habitat categories supporting *Sidalcea nelsoniana* are ruderal sites, wet meadows, valley woodlands, and mountain meadows (Table 1).

Ruderal sites include roadsides, ditchbanks, and fallow/abandoned fields. They are characteristically weedy. Soils vary from hydric to non-hydric, and usually show extreme disturbance. Introduced pasture/forage grasses are commonly the dominant species. Examples include VanWell Road and OSU Horse Center.

Only two sites, Waibel Farm and Walker Flat, support wet meadows of any size in which *Sidalcea nelsoniana* occurs. They sometimes remain wet into early summer, depending on occurrence of spring precipitation. *Carex* spp., *Juncus* spp., *Eleocharis* sp., *Lupinus polyphyllus* Lindl., and other characteristic wetland taxa are among the plants present.

Frazinus latifolia Benth. is the dominant and often the only tree in valley woodlands (e.g., Finley NWR, OSU Turkey Farm). Understory vegetation varies considerably in species composition. *Sidalcea nelsoniana* occurs most often on the perimeters of wooded areas and within clearings. When it grows under the tree canopy, it is usually etiolated.

All Coast Range sites occupy meadows and are substantially alike in species composition and topography, although their elevations vary from about 450 m to slightly over 600 m MSL. *Sidalcea nelsoniana* in mountain meadows is subject to more severe environmental conditions than it is in the Willamette Valley, due to the higher elevations and concomitant shorter growing season. The observed proportion of sterile (*i.e.*, non-flowering) plants was considerably higher at Coast Range sites; possibly as many as 50 percent of the plants did not produce flowers. Flowering stems were shorter than in the Willamette Valley and the inflorescences tended to be much more compact. Taxonomic investigations, however, have shown that *Sidalcea nelsoniana* is morphologically consistent throughout its range and there is no basis for dividing the species into separate taxa (Halse *et al.* 1989). Despite the shorter growing season in the Coast Range, flowering plants produced viable seed.

CONCLUSIONS

As a result of this study, the range of *Sidalcea nelsoniana* has been shown to be somewhat greater than previously reported. The species was also found to be much more abundant than suspected.

Sidalcea nelsoniana may have originally been part of the native valley grassland flora, but our data show it to be well adapted to ruderal habitats, in which it occurs at 79 percent of the sites, to valley woodlands (at 29 percent of the sites), and to mountain meadows (23 percent of the sites). With such a broad range of habitat requirements, and with both federal and state protection, its continued survival should be expected.

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